Claims

1. Aqueous sol containing silica-based particles, c h a r a c t e r i s e d in that it has an S-value within the range of from 10 to 45%, a viscosity within the range of from 5 to 40 cP and a molar ratio of SiO_2 to M_2O, where M is alkali metal or ammonium, within the range of from 10:1 to 40:1.

2. Aqueous sol containing silica-based particles, c h a r a c t e r i s e d in that it has an S-value within the range of from 10 to 45%, a viscosity within the range of from 5 to 40 cP and a silica content of at least 10% by weight.

3. Aqueous sol according to claim 1, c h a r a c t e r i s e d in that it has a silica content of at least 10% by weight..

4. Aqueous sol according to claim 1, 2 or 3, c h a r a c t e r i s e d in that the silica-based particles have a specific surface area within the range of from 775 to 1050 m^2/g.

5. Aqueous sol according to claim 1, 2 or 3, c h a r a c t e r i s e d in that the silica-based particles have a specific surface area within the range of from 550 to 725 m^2/g.

6. Aqueous sol according to any of claims 1 to 5, c h a r a c t e r i s e d in that the S-value is within the range of from 20 to 40%.

7. Aqueous sol according to any of claims 1 to 6, c h a r a c t e r i s e d in that the viscosity is within the range of from 7 to 25 cP.

8. Aqueous sol according to any of claims 1 to 7, c h a r a c t e r i s e d in that it has a molar ratio of SiO_2 to M_2O, where M is alkali metal or ammonium , within the range of from 15:1 to 30:1.

9. Aqueous sol according to any of claims 1 to 8, c h a r a c t e r i s e d in that it has a pH of at least 10.6.

10. Process for the production of silica-based particles, c h a r a c t e r i s e d in that it comprises the steps of

(a) acidifying an aqueous silicate solution to a pH of from 1 to 4 to form an acid sol,

(b) alkalising the acid sol at an SiO_2 content within the range of from 4.5 to 8% by weight to a pH of at least 7,

(c) allowing particle growth of the alkalised sol for at least 10 minutes, and then

(d) alkalising the obtained sol to a pH of at least 10.0.

11. Process for the production of silica-based particles, c h a r a c t e r i s e d in that it comprises the steps of

(a) acidifying an aqueous silicate solution to a pH of from 1 to 4 to form an acid sol,

(b) alkalising the acid sol at an SiO_2 content within the range of from 4.5 to 8% by weight,

(c) heat-treating the alkalised sol at a temperature of at least 30°C, and then

(d) alkalising the heat-treated sol to a pH of at least 10.0.

12. Process according to claim 10 or 11, c h a r a c t e r i s e d in that it the alkalisation according to (b) and (d) is carried out by means of an aqueous silicate solution.

13. Process according to claim 10, 11 or 12, c h a r a c t e r i s e d in that the particle growth and heat-treatment according to (c) is carried out at a temperature within the range of from 35 to 95°C.

14. Process according to claim 10, 11, 12 or 13, c h a r a c t e r i s e d in that the particle growth and heat-treatment according to (c) is carried out for 20 to 240 minutes.

15. Process according to any of claims 10 to 14, c h a r a c t e r i s e d in that the alkalisation according to (d) produces a silica-based sol having a molar ratio of SiO_2 to M_2O, where M is alkali metal or ammonium, within the range of from 15:1 to 30:1 and a pH of at least 10.6.

16. Silica-based particles obtainable by a process according to any of claims 10 to 15.

17. Use of silica-based particles according to any of claims 1 to 9 or 16 or produced by a process according to any of claims 10 to 15 as drainage and retention aids in the production of paper.

18. Process for the production of paper from an aqueous suspension containing cellulosic fibres, and optional fillers, which comprises adding to the suspension silica-based particles and at least one charged organic polymer, forming and draining the suspension on a wire, c h a r a c t e r i s e d in that the silica-based particles are present in an aqueous sol according to any of claims 1 to 9 or produced by a process according to any of claims 10 to 15.

19. Process according to claim 18, c h a r a c t e r i s e d in that the charged organic polymer is cationic starch or cationic polyacrylamide.

20. Process according to claim 18 or 19, c h a r a c t e r i s e d in that before adding the silica-based particles to the suspension the silica-based particles are diluted or mixed water to form an aqueous sol having a silica content of from 0.05 to 5% by weight.

21. Process according to any of claims 18 to 20, c h a r a c t e r i s e d in that the silica-based particles are added to the suspension in an amount of from 0.005 to 0.5% by weight, calculated as SiO_2 and based on dry cellulosic fibres and optional fillers.